

DETAILS OF THE WEATHER OF THE MONTH IN THE UNITED STATES.

CYCLONES AND ANTICYCLONES.

By R. HANSON WEIGHTMAN, Meteorologist.

Cyclones.—The month was unusual on account of the number of secondary developments, of which there were 10 within the confines of the United States and of these 5 first appeared over the Rocky Mountain and Plateau Regions. The table which follows gives the number of lows by types.

Lows.

	Al- berta.	North Paci- fic.	South Paci- fic.	North- ern Rocky Moun- tain.	Colo- rado.	Texas.	East Gulf.	South Atlan- tic.	Cent- ral.	To- tal.
March, 1920.....	4.0	3.0	1.0	2.0	3.0	1.0	1.0	1.0	2.0	18.0
Average number, 1892-1912.....	3.6	2.1	1.1	0.3	1.9	1.3	0.4	0.3	0.7	11.8

Anticyclones.—The number of HIGHS was slightly above the average and anticyclones were fairly well distributed with regard to type as indicated in the table below.

Highs.

	North Paci- fic.	South Paci- fic.	Al- berta.	Plateau and Rocky Moun- tain region.	Hud- son Bay.	Total.
March, 1920.....	1.0	1.0	7.0	1.0	0.0	10.0
Average number, 1892-1912.....	0.9	0.7	5.6	0.9	0.5	8.5

THE WEATHER ELEMENTS.

By P. C. DAY, Climatologist and Chief of Division.

[Weather Bureau, Washington, May 1, 1920.]

GENERAL SUMMARY.

March, 1920, fully maintained its reputation as a stormy month over many portions of the country, the pressure, temperature, wind, rain, and other phenomena contributing at some time in making the month as a whole one of marked extremes.

Chief among the notable weather events of the month may be mentioned the following:

Severe cold over the southeastern States at the beginning of the month, when freezing temperatures extended into the central portions of the Florida Peninsula, and killing frosts, locally, to near the southern extremity. The temperatures over the extreme southern portions of the State were as low as, or lower than ever before recorded in March, and much damage was sustained by the early spring trucking interests.

The severe wind and snow storms of the 5th and 6th over the northeastern States, particularly in New England, where the snowfall was in many cases the heaviest ever recorded in March. The storm was comparable with the great "blizzard" of March, 1888, and in some sections it is reported as being even more severe than that. High winds drifted the snow to such an extent as to blockade traffic completely, which in places was not resumed for a week or more.

The severe cold that overspread the Rocky Mountains and thence eastward and southeastward to the Atlantic and Gulf States from the 6th to 8th brought the lowest temperatures of the month over those regions, and in numerous instances the lowest temperatures ever reported in March. During this period temperatures fell to 40°, or more, below zero in many northern districts, and below-zero temperatures were reported at exposed points as far south as Oklahoma, Tennessee, and western North Carolina. Over the Florida Peninsula, however, the temperatures were not as low as those reported at the beginning of the month.

On the 15th and 16th one of the severest storms ever experienced developed over the upper Missouri Valley and moved to the northward of Lake Superior. The barometric pressure over a large area, including the Dakotas and portions of adjoining States reached lower points than ever before known in that region. Snow fell continuously in portions of the storm area for nearly two days, and high northwest winds drifted it to such an extent as to interfere greatly with traffic. In portions of North Dakota it is described as one of the worst blizzards of record. Five lives were lost due to freezing, and stock, unprotected and already weak from the long cold winter and the frequent lack of food, suffered severely, and much loss was sustained.

On the night of the 22d one of the most brilliant and extensive auroras ever witnessed was observed from all States, particularly in the central and eastern districts, where the absence of clouds permitted unusual opportunity for its wide display. Cloudy weather prevented its general observance in many districts west of the Mississippi River. (A detailed account of this aurora will be published in an early issue of this REVIEW.)

On the afternoon of the 28th, in the southeast quadrant of an area of low pressure moving from the middle Plains region toward the Great Lakes, a series of 9 tornadoes developed in the vicinity of the southern end of Lake Michigan, particularly near Chicago, where 45 lives were lost and several million dollars worth of property was destroyed. Another series of severe storms, some with tornadic characteristics, occurred about the same time in portions of Georgia and surrounding States, where 43 lives were lost and considerable property was destroyed. Full reports of these storms will be found in the April issue of this REVIEW.

PRESSURE AND WINDS.

The pressure was frequently low over the western and northern districts, and it remained high for considerable periods in the Southeastern States. As a result, the averages for the month were below normal over practically all portions of the United States west of the Mississippi and north of the Ohio, and over Canada as well, as far as disclosed by observations. The negative departures were unusually large over the middle Mississippi Valley and central Plains regions and thence northward into Canada.

The pressure distribution favored frequent high winds in many parts of the country, and over portions of the Plains region and Mississippi Valley the month as a whole had the greatest wind movement ever recorded. The winds were particularly high over northeastern districts on the 5th and 6th, and over the northern Plains region and upper Mississippi Valley on the 15th and 16th. On the 28th high winds prevailed locally from the middle Mississippi Valley to the Great Lakes and in portions of

¹ See note on the term "blizzard," MONTHLY WEATHER REVIEW, February, 1920, 48: 82.

the East Gulf States, a number of localities reporting severe tornadoes, which are referred to elsewhere.

The low pressure in northern districts favored southerly winds between Texas and the Great Lakes and over much of the country to the eastward. From the upper Lakes west to the Rocky Mountains the winds were mostly from the NW. (See Chart VII.)

TEMPERATURE.

The warmest periods of the month were mostly during the last decade, principally from the 27th to the 31st, over the districts east of the Rocky Mountains, but in the Plateau and Pacific Coast States the warmest periods were about the 13th and 14th, and again on the 20th and 21st.

In the cold period of the 1st and 2d minimum temperatures were from 25° to 35° below zero F. at some exposed places in northern New York and the interior of New England, and freezes and killing frosts on the Gulf coast and Florida peninsula did much damage to vegetation. Killing frosts also occurred over portions of the Pacific States at this time. The most extensive cold area of the month, embracing practically all portions of the country save the extreme south and west, occurred from the 6th to the 8th. Over many northern districts the minimum temperatures ranged from 30° to 40° below zero F., and they were below freezing over practically all southern districts. In many sections the temperatures during this period were the lowest ever observed in March.

As a whole, the month was warmer than normal over most northern and central districts from the Rocky Mountains westward, and it was slightly cooler in the Southern States and generally to westward of the Rocky Mountains. (See Chart IV.)

PRECIPITATION.

Rains were frequent and occasionally heavy in the central and southern districts east of the Mississippi River and over portions of the Pacific Coast States, and heavy snows fell at different periods in the northeastern States, also locally in the Lake region, the Dakotas, and in many of the mountain districts of the West.²

The total precipitation for the month (see Chart V) was above normal over the East Gulf and South Atlantic States, except in Florida, generally over the central valleys and eastern portions of the Great Plains and over the Plateau and Pacific Coast States. Small areas of deficient precipitation appear over the upper Ohio drainage, and in portions of the Middle Atlantic States, over Florida, and the west Gulf States, and generally in the Rocky Mountain region. In some Pacific coast districts the fall during the month was more than had occurred during the entire season preceding.²

SNOWFALL.

Measurable quantities of snow fell over all districts save in portions of the Southeastern States, over the greater part of Texas and Oklahoma, and along the immediate Pacific coast. (See Chart VIII.) The deep snow covering New England and the northern portions of New York

at the end of February was further augmented during March by heavy falls on the 5th and 6th, which again blocked transportation, barely recovered from the heavy snow and ice storms so frequent during the preceding months. Some heavy falls of snow occurred in the Lake region, and during the storm of the 15th and 16th over the Dakotas and surrounding States heavy snow fell over large areas, and much loss to stock and derangement of transportation resulted on account of the accompanying and following high winds and severe cold.

Over other districts east of the Rocky Mountains the snowfall was generally light. In the Rocky Mountains considerable snow occurred, particularly in Colorado, where the total depth of new snow was in some cases more than five feet. In the mountains of eastern California and the adjacent portions of Nevada and Oregon heavy snows occurred during the month, greatly relieving the outlook for a disastrous shortage of water during the coming summer. On the whole the snow over the western mountain districts was sufficient to justify a general estimate of near the normal supply of water for irrigation and other purposes, except in some portions of California where the lack of snow during the winter months has not yet been made good, and the generous falls during March are not in condition to remain unmelted till late in the season as is the case when the snow falls earlier in the winter.²

RELATIVE HUMIDITY.

From the Rocky Mountains eastward the relative humidity was everywhere less than normal, save for scattered small areas in New England, the upper Lake region, and portions of the Dakotas. In the Plateau region and the adjacent portions of the Pacific Coast States the relative humidity was generally less than normal, though usually to only a small per cent, except in portions of Arizona and New Mexico. In the middle Plains and thence eastward to the Appalachian Mountains there was a large deficiency in the relative humidity, ranging from 10 to 15 per cent or more, over wide areas despite the fact that precipitation during the month was frequent and at times heavy in this region.

A rather unusual occurrence of low vapor pressure and low relative humidity was observed about noon of the 28th, over a narrow strip from eastern Missouri northward over central Illinois. The relative humidity ranged from 11 per cent at St. Louis, Mo., to 16 and 18 per cent, respectively, at Springfield and Peoria, Ill., in some cases the lowest readings ever observed.

As the humidities were much higher on all sides, the extraordinary dryness of this strip must have been the result of a rapid downward movement of air from high and dry altitudes, immediately in the rear (west) of the belt of wind convergence where there were severe thunderstorms with tornadoes.

LOCAL STORMS.

Numerous local and severe widespread storms occurred during the month, descriptions of which will be found in other portions of this and the next issues of the REVIEW.

² Cf. "The drought in California," p. 156-157.